Show that of all curves of a given length, traced on one plane between two given points, and made to revolve around a common axis situated in that plane, the Catenary generates a minimum area.

MECHANICS.

Conducted by B. F. FINKEL, Kidder, Mo. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

12. Proposed by J. F. W. SCHEFFER, A. M. Hagerstown, Maryland.

A horizontal table without weight is supported on three points, A, B, and C. A weight W is laid upon the table, at a point G. If $AG=a$, $BG=b$, $CG=c$, $\angle AGB=\alpha$, $\angle BGC=\beta$, and $\angle CGA=\gamma$, find the pressures upon A, B, and C.

Solution by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

The momental equations with respect to AG, BG, and CG, are respectively:

$$P_B\times b\sin(\pi-\alpha)=P_C\times c\sin\beta.\ \therefore\ \frac{P_B}{P_C}=\frac{c\sin\beta}{b\sin\alpha}\ldots.(m).$$

$$P_C\times c\sin(\pi-\beta)=P_A\times a\sin[\gamma-(\pi-\beta)].\quad\therefore\ P_C=\left(\frac{a\sin\alpha}{c\sin\beta}\right)P_A\ldots.(n).$$

$$P_A\times a\sin(\pi-\gamma)=P_B\times b\sin[\alpha-(\pi-\gamma)].\quad\therefore\ P_B=\left(\frac{a\sin\gamma}{b\sin\beta}\right)P_A\ldots.(p).$$

Put $K=\left(\frac{\sin\beta}{a}+\frac{\sin\gamma}{b}+\frac{\sin\alpha}{c}\right)$; then from the equation, $P_A+P_B+P_C=W$, we deduce the following *symmetrical* and elegant results:

$$P_A=\left(\frac{\sin\beta}{aK}\right)W,\ P_B=\left(\frac{\sin\gamma}{bK}\right)W,\text{ and }P_C=\left(\frac{\sin\alpha}{cK}\right)W.$$

Second Solution.

According to the logic of common-sense, why not write

$$P_A=\left(\frac{\triangle BCG}{\triangle ABC}\right)W,\ P_B=\left(\frac{\triangle CAG}{\triangle ABC}\right)W,\text{ and }P_C=\left(\frac{\triangle ABG}{\triangle ABC}\right)W;$$

and then with the heavy artillery of the higher mathematics *successfully defend* our position ?

NOTE:—These two solutions are to take the place of the *first* solution of this problem published in the November MONTHLY.—*F. P. M.*